

Position Papers

Life Cycle Assessments and Product-Related Environmental Policy

The Position of the Federal Environmental Agency (Berlin, Germany) *

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- I The Situation of Life Cycle Assessments and the Interest of the Federal Environmental Agency
- II Life Cycle Assessments and Product-Related Environmental Policy: Selected projects of the Federal Environmental Agency
- III Life cycle assessments and product-related environmental policy: Summarizing theses

I The Situation of Life Cycle Assessments (LCAs) and the Interest of the Federal Environmental Agency

The importance and the new quality of product-related LCAs as an instrument of preparing decision-making in environmental policy is due to the implementation of two indisputable claims of modern environmental protection:

- the intermedia consideration taking into account relevant input flows (energy carriers, materials, water) and output flows (air, sewage, waste, noise)

and

- the inter-life cycle consideration (from cradle to grave) of production, via consumption and use, up to disposal including the examination of recycling options.

To allow environment-oriented decisions relating to the production, design or use and disposal of products in the various interfaces and on various levels, an instrument is required which opens and processes the respective life cycle, collects and summarizes the comprehensive data – including their adverse impacts on the environment –, and assesses and finally transfers them into an evaluation. These requirements are fulfilled by LCAs.

Therefore, the Federal Environmental Agency is highly interested in LCAs not only playing a role in the product-related environmental policy but also being considered where fundamental decisions are on the way or shifts with long-term impacts on environmental protection, and where a sustained, i.e. durable environmentally friendly development works. This refers not only to industrial enterprises or associations representing them, this refers also to trade, consumer advice centres, environment advisory offices, trade unions and many other circles. LCAs are to contribute "to substantiating specific recommendations for decision-makers" (ISO 14043).

LCAs are a decision support in environmental protection. Efforts are made to provide – from the viewpoint of an overall environmental protection – reconstructable evaluations via competitive

alternatives to solve environmental problems and/or to open possibilities of optimization in the product life cycle. First of all, this shall be performed from the viewpoint of environmental protection without considering economic and social impacts.

However, there should be no doubt that the results of LCAs can be just one aspect in decision-making processes in government, economy and society and have to be weighted additionally with economic and social factors.

In the meantime, LCAs have outgrown childish ways and resulted a wealth of important conclusions. There should be mentioned the efforts to come to an agreement on methods: on the national level in the scope of the Standards Committee 'Fundamentals of Environmental Protection in DIN (NAGUS)' and, particularly on the international level, in the framework of ISO (International Standardisation Organisation) and the scientific society of SETAC (Society of Environmental Toxicology and Chemistry). In this connection, special importance is attached to the basic document ISO 14040. It presents the following basic information:

- The function of LCAs is mentioned as a basis of decision-making for the ecological improvement of products as the most important application, certainly also a reaction on the worldwide predominating role of industrial enterprises in initiating, financing and using LCAs.
- Furthermore, this standard recognizes explicitly the consideration of LCAs in decision-making processes relating to environmental policy. The English text points to 'public policy making' as an important application of LCAs.
- The participation of experts and representatives of interested circles from industry, trade, consumers, environmental associations, and trade unions – recognized and practised to the best of ability in many publicly relevant LCAs in Germany for a long time – was explicitly paid attention by the term critical review. In German projects, additional project advisory councils are established, especially in LCAs intended for publication, thus affecting the public opinion.
- The possibility to come to comparative assertions has been confirmed as an important target of LCAs. However, in the case of a publication special rules are applicable, e.g. as

* Paper presented at the Meeting 'Life Cycle Assessments and Responsibility for Products', Hannover, Germany, September 1-2, 1999

regards the 'critical review' or for the conduction of sensitivity analyses. It is interesting that ISO 14040 explicitly confirms that also an environmental superiority of a system to another one or its environmental equivalency may be attested by LCAs.

With ISO standard 14040, a standard relating to the conduction, communication and structuring of LCAs has been made available to specialist circles. It will give clear signals for comprehensive, life cycle-oriented decisions suitable to reduce the environmental impacts from products in industrial enterprises, trade, in public and private administrations, yet also in environmental policy. This is of outstanding importance in the sense of a long-term oriented environmental protection.

It was possible to largely conclude the principle discussions on LCAs in 1998 on the national and international level by four milestones:

1. After lengthy and unending discussions, the ISO meeting week in June 1998 in San Francisco succeeded in reaching worldwide an agreement in the sphere of the Evaluation of LCAs. After ISO 14042 – Life Cycle Impact Assessment – having been adopted in the meantime with overwhelming majority, the prioritization of environmental impacts in the context of an LCA is possible. Though it will be necessary to still get accustomed to technical terms such as 'grouping', 'sorting', or 'ranking', the respective procedures, however, are considered by the experts of the Federal Environmental Agency in continuity to the methods applied so far. Our proposal – though being solely the method adopted by the Federal Environmental Agency as 'one party' – for the implementation of these targets will be published in our 'TEXTE' series.¹
2. In 1998, it was also possible to solve communication problems relating to the LCA subject, which obviously existed in Germany between industry and government. After intensive discussions and against the background of a difficult situation of the 'LCA for Beverage Packaging II', industry and the Federal Environmental Agency "agreed on procedural rules of the Federal Environmental Agency for conducting LCAs" in May 1998. On this basis, the associations and enterprises concerned were ready to provide the primary data required for life cycle inventories. In these explanations relating to ISO 14040, the Federal Environmental

Agency stated that specific procedural rules referring e.g. to the communication of the goal and scope of the study, the establishment and participation of a project advisory council and the 'critical review' will be observed and that the Agency expects the participants in economy to similarly proceed in their LCA studies.²

3. Finally, this year (1999) it has also been possible to successfully finalize the project of the Federal Ministry for the Environment and the Federal Environmental Agency relating to the 'evaluation in LCAs' which was heavily disputed for a long time.³ The challenge is to find out a mean between the two poles of a subjective optionality and a static evaluation according to a fixed scheme. The formulations found give now valuable information on how to reach an agreement in the difficult field of evaluating LCAs and drawing conclusions for a product-related environmental policy. Let me mention the following essential items as examples:
 - The (ecological) evaluation of an LCA may not release an automatism as regards environmental policy decisions.
 - LCAs are evaluated against the background of actor-specific and individual interests and values and thus the evaluation is basically subjective and not objectifiable. Even therefore, a plurality of evaluation methods should be available.
 - The organization of the process of evaluation; i.e. the procedure, is equally important as the choice of an evaluation method. Important requirements as to the process are e.g. compiled in the 'procedural rules for conducting LCAs' already mentioned.
 - Identifying the target, organizing the process of evaluation and the choice of the method(s) to be applied are the responsibility of the client ordering an LCA.

The discussions held so far were burdened by the fear of industry that the government could, by means of a consensual evaluation method, create an instrument for comparable LCAs allowing to unilaterally and systematically interfere with the product planning of industry. LCAs, however, can solely support the governmental environmental policy when for superior reasons government initiatives and measures are considered to be necessary in the interest of environmental protection. In this scope, LCAs contribute to elucidating technical foundations which can then result in decisions meeting the demands of modern environmental protection.

4. The fact that the German Federation of Industry (BDI) has continued this discussion constructively by publishing an easily understandable brochure this year (1999) is especially to be appreciated.⁴ The brochure includes the position pa-

²These procedural rules are compiled in the anthology 'Materialien zu Ökobilanzen und Lebensweganalysen, Aktivitäten und Initiativen des Umweltbundesamtes, Bestandsaufnahme März 1997' (Materials relating to LCAs, activities and initiatives of the Federal Environmental Agency, Inventory of March 1997) (UBA-TEXTE 26/97, to be updated)

³Braunschweig, A. (Institute of Economy and Ecology, University of St. Gallen): Bewertung in Ökobilanzen, Projektbericht und Projektdokumentation (Assessment in LCAs. Project report and documentation), Berlin 1999 (to be published in the UBA-TEXTE series).

⁴Bundesverband der Deutschen Industrie e.V. (BDI) (German Federation of Industry): Die Durchführung von Ökobilanzen zur Information von Öffentlichkeit und Politik; eine Orientierungshilfe für den Umgang mit Ökobilanzen in Unternehmen und Verbänden (Conducting of LCAs for information of the public and politics; a guideline for dealing with LCAs in enterprises and associations), Cologne 1999.

¹Bewertung in Ökobilanzen. Methode des Umweltbundesamtes zur Normierung von Wirkungskategorien, Ordnung (Rangbildung) von Wirkungskategorien und Auswertung nach ISO 14042 und 14043, Version '99 (Evaluation in LCAs. Method of the Federal Environmental Agency to normalize impact indicators, sorting (ranking) of impact categories and interpretation according to ISO 14042 and 14043), UBA-TEXTE 92/99, Berlin 1999.

per 'Innovations in Market Economy – the Political Role of LCAs', already published in 1998, which is identified as 'fourth milestone' (see p. 196). This position paper contains, first of all, statements to be evaluated as unrestrictedly positive such as 'Industry stands up for an intensive application of LCAs'. Certainly, it would be of advantage to establish more relations between LCAs and other methods of environmental management. As an example I would like to mention the inclusion of LCAs for products and services in the ecoaudit system. Albeit these methods are separately considered in the ISO 14000 series, they should again be computed and co-ordinated in managerial practice, where this seems to be appropriate. Primarily the approach to prepare 'win-win' arguments for an intensified application of LCAs in economy is convincing. The keywords 'cost economy potentials', 'competition advantages', 'early-warning system' 'image winning', 'staff motivation' and 'orientation to the supplier chain or the customer' stand for that. The fact that industry – at least basically – acknowledges that LCAs form also part of the implementation of the so often sworn partial or total responsibility of producers for the whole life cycle of products is likewise to be appreciated.

Yet, the position paper also contains statements to be assessed controversially. Basically, they stem from the experience gathered in the discussion on packaging materials, which may not necessarily be related to the LCA subject. In addition, the position paper 'squirms' in section 3 'The Potential of LCAs for Environmental Policy'. On the one hand, it is stressed that LCA is only an aid in decision-making processes relating to environmental policy – and this should be supported. This is expressed by statements such as "LCAs (have to be) carefully analysed to make responsible decisions" or by the following relevant statement "(LCAs) do not relieve decision-makers of their responsibility, the legitimization of political decisions may not be 'delegated' to LCAs. The basic aim of the LCA instrument is rather to produce debatable, basically changeable results".

On the other hand, however, positions which I cannot agree with are continuously built up: "Implementing the information obtained by LCAs in the development of products which are successful on the market and efficiently satisfy the requirements of the consumer is a task to be solely fulfilled by enterprises. That is why LCAs are not suited to form the basis for a governmental intervention in the market, e.g. by means of taxes, quota, restrictions in use or other instruments of environmental law." Does this mean that the government may no longer apply instruments of environmental law in product-related environmental policy? In this case this should be clearly stated – outside the discussion on LCAs. Or does the statement mean that the results of LCAs may, by no means, be used for substantiating regulations relating to environmental law but instead of this other technical measures be used? I have problems with this. LCAs do belong to the technical foundations by means of which the Federal Environmental Agency substantiates e.g. its recommendations for action. Examples are described in Part II. Or considering it the opposite way: Are we expected to mention in our recommendations for action that LCAs have not been considered? The reaction of the public would leave no doubt: we would be blamed of having presented solely immature recommendations as they have been formulated without analyzing available LCAs. However, if the statement is to be un-

derstood in the way that recommendations for action may not be derived solely from LCAs, I, on my turn, can agree as recommendations for action may scarcely be substantiated only by one foundation – not only in political everyday life but also by the Federal Environmental Agency.

5. In this connection, the Federal Environmental Agency recognizes the requirement to examine the legal possibilities and limits of applying LCAs. We have charged Professor Rehbinder, University of Frankfurt/Main, to perform a research project which is to investigate the possibilities of providing instruments for conducting LCAs, in particular with regard to waste management aspects. The legal problems involved concern predominantly the constitutional area and need to be discussed comprehensively. For example, the problem is addressed to which extent the law may refer to LCA standards (problem of dynamic reference) and which legal consequences may be connected with LCA investigations at all (elaboration of methods/principle of determination). Further subjects are requirements as to the contents of LCAs and the protection of industrial and business secrets. The project also discusses connections with the ecoaudit and includes, in particular, the experiences gathered by industry. For this reason, interviews with representatives of industry are intended.⁵

II LCAs and Product-Related Environmental Policy: Selected projects of the Federal Environmental Agency

Due to a series of completed projects, we can now refer to a wealth of experiences with conclusions from LCAs. Additionally, we can report on a series of latest projects referring to the discussion on LCAs which will be of importance to future recommendations for action of the Federal Environmental Agency. In the following I may mention just the most important projects:

II.1 Waste management – closed substance cycle waste management

As to the number of projects, 'waste management' and 'closed substance cycle waste management' are the most important fields of our LCA work. In particular §§ 5 and 6 of the 'Act for promoting closed substance cycle waste management' demands – at least indirectly – to apply LCAs for dealing with the problem which option we should strive for utilizing specific wastes or whether the disposal of waste is to be preferred.

The project LCAs in Waste Management implemented between 1995 and 1998 investigated the methodical basis to apply LCAs for waste management problems by the examples used tire and refrigerator.⁶ The experience from the two case studies form, together with the methodical part, the basis of the guideline 'General recommendations for determining the more environmentally compatible utilization'. This document will also serve the further preparation of the regulations which are the basis of the 'Act for promoting closed substance cycle waste management'. The results of the case studies themselves are likewise of interest:

⁵ The final report of this project is to be published in 2000.

⁶ Institut für Energie und Umweltforschung, Heidelberg (ifeu): Ökologische Bilanzen in der Abfallwirtschaft (Ecological balances in waste management), Berlin 1999 (UBA-TEXTE 10/99).

- In the case of used tires, 'remoulding' aggregate to recycled rubber powder, to bitumen, and for the production of floor coverings substituting PVC flooring, proved to be ecologically most favourable. This result has been ensured by a project servicing advisory council.
- In the case of refrigerators, dismantling aimed at recycling is assessed to be most favourable.

A further important project refers to paper products by the example of newspapers, journals and copy paper. The project LCAs for Graphic Paper considers the problem whether a higher waste paper share in paper products will be actually more favourable from environmental aspects and whether we hold the correct position with our initiatives to further increase – also with the aid of the ecolabel – the share of recycling paper in public procurement and for the private consumer. Or may the suppliers of cellulose or forest owners be right to prefer the production of energy from waste paper as compared with recycling? The solution of these questions is methodically embedded in a comparison of measures for waste paper disposal, i.e. *combustion versus substance utilization*. This project will be completed soon (in 2000).

A later project deals with the ecological assessment of ways of waste oil disposal against the background of the planned amendment of the Waste Oil Ordinance. Processing to get basic oil for lubricants, fuel oil, methanol and its energetic utilization in cement factories are compared. The LCA commenced 1998 has immediately hit upon high interest among the experts. Results of this project might be expected in the autumn of this year (1999; in 2000, the project is in its final phase: critical review). The project is supplemented by an economic analysis of the ways of waste oil disposal.

In 1998, we also started, for the first time, an LCA in the agricultural area entitled 'Material assessment for a sustained utilization of wastes on areas used for plant cultivation'. The study is divided in two essential contents:

1. Modelling and assessment of plant cultivation on the basis of existing substance input/ output on plant cultivation areas.
2. Modelling and assessment of deviating options of utilizing sewage sludge and compost in the sense of the 'Act for promoting closed substance cycle waste management' with the aim of a sustained utilization.

We expect the completion of the project in 2000. We expect to obtain data relating to the basically existing potentials of utilizing reusable waste fertilizer in conformity with the legislation on the level of administrative districts. On the other hand, recommendations for action relating to an ecologically optimized utilization of various nutrient carriers – commercial fertilizer, sewage sludge, compost, mineral fertilizer – are to be derived from the results of this LCA, under the condition of a constant crop yield. These findings are intended to be evaluated for the amendment of the 'Sewage Sludge Ordinance' and the 'Municipal Waste Ordinance' to be developed.

II. 2 Packaging material area

Scarcely an LCA might have been discussed more intensively worldwide than the LCA for drinks packaging systems prepared between 1990 and 1995 by the examples of milk and beer.⁷ In

⁷ Federal Environmental Agency, LCA for drinks packaging systems, UBA-TEXTE 52/95, Berlin 1995.

the public discussion of the results, unfortunately, the important conclusions relating to the high importance of the transport phase and the recommendation for action 'Buy regional products' have not appropriately been appreciated due to the dominating discussion on the packaging material options. Likewise the LCA for drinks packaging systems II has met with high interest even before its true commence. We expect that this LCA will contribute to further improving our technical foundations for promoting ecologically favourable packaging systems on the one hand, and optimizing packaging systems on the other hand. This LCA pursues the following targets:

- In the scope of a status quo analysis, information on ecologically relevant material and energy flows in packaging systems used for mineral water, soft drinks, juice and wine will be compiled, and their ecological impact potentials compared.
- In the scope of realistic prognosis scenarios, technical and logistic measures for an ecological improvement of these packaging systems will be investigated.

We expect first results for further discussing the project in the accompanying committee and the critical review panel at the end of 1999 (phase I 'status quo analysis' has been finished in July 2000 with the report by the critical review panel).

II. 3 Building and living area

Also the study Product LCAs and their possibilities of use in the building area (already published) presents conclusions relating to waste management.⁸ Thus, an improvement of the assessment may be achieved when using recycling material for PVC and PE floor covering. In the study itself material variants for window frames, floor and roof covering are compared from aspects of environmental protection. Methodical peculiarities result for building products from the 'double' process of manufacture and processing, i.e. in the factory of the building product producer and at the construction site when the building is erected, and from the clearly longer phase of use as compared with other products. The constructional integration of building products into structural components and optimization during building planning, processing of the building products at the construction site, maintenance and repair is more decisive for the LCA than only material-related differences resulting from manufacture. A wooden window frame is ecologically more advantageous as compared with that of PVC provided, 1. a good weathering resistance has been implemented, 2. high processing quality is ensured, 3. long service life by maintenance can be ensured, and 4. painting with ecologically friendly lacquers has been performed.

Another important project in the building and living area assesses the material flows connected with various developments.⁹

⁸ Witassek, R. and Rudolphi, A.: Produktökobilanzen und ihre Anwendungsmöglichkeiten im Baubereich (LCAs of products and their possibilities of use in the building area), Vol. 1 and 2, Summary of the Federal Environmental Agency, Berlin 1998 (UBA-TEXTE 69/98 and 70/98).

⁹ Öko-Institut e.V.: Bauen und Wohnen, Stoffströme und Bedürfnisse (Building and living, material flows and requirements), brochure 1998; the publication of the research project 'Stoffflußbezogene Bausteine für ein nationales Konzept der nachhaltigen Entwicklung' (Material-related modules for a national concept of sustained development), on which it is based in the UBA-TEXTE series, is under preparation.

The three development paths 'reference scenario', 'efficiency scenario', and 'scenario relating to change of structure and attitudes' prepared during our study 'Sustained Germany' were taken as basis. The project provides results concerning the following essential problems:

- To which extent is environment affected year by year by way of the consumption of resources and by emissions and wastes caused by the building and living requirement area in Germany?
- In which way may these material flows develop under various assumptions until the year 2020?
- In which way may these material flows develop with regard to national environmental targets, as e.g. the climate gas reduction target?

To answer these questions, comprehensive data were collected relating to the expected requirements for living space and building activities including the preceding process chains, with essential actors participating. To utilize these data for calculating scenarios, a software was developed for the conduction and evaluation of material flow analyses relating to the requirement area. The results of this study provide, 1. a contribution to the discussion on a sustained development in the building and living area; and 2. a method was developed which can survey the whole utilization of the environment for other requirement areas, thus providing the basis for a debate on a requirement-oriented sustainability.

II. 4 New technologies

We gathered first experiences in the project organization of LCAs with the so-called LCA of rapeseed oil conducted even before the procedural rules of ISO 14040 existed. Incidentally, the public discussion on assessing the use of rapeseed methyl ester (RME) instead of diesel fuel has never ceased in spite of the clear results achieved in our view. This considering, you will realize that even investigations carried out by the Federal Environmental Agency are not always automatically implemented. The conclusions from 1993 have basically not changed, even after the resource and emission assessment having been updated and a supplementing feasibility study of this fuel alternative conducted: From an overall ecological perspective, RME does not show advantages as compared with diesel fuel, as lower-cost technical alternatives for reducing the emission and consumption of resources are available.

The Federal Environmental Agency published a report on the use of the fuel cell technology in traffic currently under discussion where the evaluation bases, required from an environmental view, are summed up and discussed. As fuel cell drives are, from an environmental view, only 'not much better' but by far more expensive than advanced Otto engines, a differentiated communication of the subject is especially important! It was not later than in May 1998 that a first report on the state of affairs was presented to a broad expert audience. In the course of the technical discussion, our comments could not be refuted due to the lack of new arguments and facts. Yet, the partly wide-ranging suggestions of the experts were considered in an extension of the report. On May 11 of this year (1999), I presented the final report to the science press confer-

ence. The report is, among others, an important orientation in setting priorities for promotional measures in the traffic area.¹⁰

II. 5 Traffic

So far, the work in the traffic area primarily concentrates on pollutant-related environment comparisons but not on complete LCAs. Yet, considering the situation, this is sufficiently informative as the pollutant emissions caused by the operation of motor vehicles mainly affect the result of a comparable evaluation. With the consumption and emission being further reduced, the inclusion of the production will gain special importance and be also considered in future research work. In addition, it happens in the course of the whole life cycle that pollutants enter the environment which are – albeit of small quantities – of problematic impact as compared with pollutants resulting from operation, e.g. fluoro- and chlorofluorohydrocarbons or dioxins.

That is why a project implemented under the title *passenger car emission assessment* aims at conducting an assessment of the whole life cycle starting from the extraction of raw materials and primary energy via the production, operation, maintenance and repair up to the disposal including recycling and final storage. In view of the high number of individual parts with a partly complex composition, a detailed investigation of all parts is not yet possible. The study is based on typical passenger car models and the variants derived from them. Air pollutants which are of importance due to their impacts and quantities released are assessed. That means, the project does not involve the conduction of an LCA but is to allow a comparison of the life cycles, in particular with the use cycle as to its importance for environmental pollution, and a comparison of various vehicle concepts as to essential properties to derive further actions.

The results achieved by another, not less interesting, project of the Federal Environmental Agency have already been published. The overall emission assessments of travelling by various transport vehicles, among others, were compared with each other under the title 'Traffic efficiency and emission of air pollutants by the passenger air traffic in Germany'.¹¹ The comparison was made by way of examples for selected destinations: Apart from the comparison of means of transport which clearly shows the environment polluting impacts of flying and car driving, also the absolute impacts of pollution, in particular of long-distance travelling, become visible. Though it may have a slightly provoking effect, we should state: a holidaymaker going by train from Dortmund to East Friesland and back consumes a primary energy of 0.4 GJ. A holidaymaker going by air from Dortmund to Thailand needs for his holidays with 32.7 GJ more than by 80 times more primary energy. This is a good example of how to illustrate problems by comparisons.

¹⁰ Kolke, R. (Federal Environmental Agency): *Technische Optionen zur Verminderung der Verkehrsbelastungen. Brennstoffzellenfahrzeuge im Vergleich zu Fahrzeugen mit Verbrennungsmotoren* (Technical options for reducing traffic load. Fuel cell vehicles as compared with combustion-engined vehicles). Berlin 1999 (UBA-TEXTE 33/99).

¹¹ Institut für Energie und Umweltforschung (ifeu) – *Verkehrsleistung und Luftschaadstoffemissionen des Personenflugverkehrs in Deutschland 1980 – 2010 – unter besonderer Berücksichtigung des tourismusbedingten Flugverkehrs* (Traffic efficiency and emission of air pollutants by the passenger air traffic in Germany 1980 – 2010 – with special regard to the tourism-related air traffic), Berlin 1996 (UBA-TEXTE 16/96).

II. 6 Energy

In all LCAs, energy-related data are of relevance for the *direct* use of energy of the life cycle of objects to be assessed as well as *indirectly* for energy-intensive materials and products to be included. To reduce the expenditure of processing these energy-related data for preparing life cycle inventories compatibly processed basic data would be of great help.

The research project 'Preparation of basic data relating to energy input and environment pollution of energy-intensive products and service for LCAs and products' which is still being continued investigates in a more profound way the possibilities of using the concept **cumulative energy demand** presented in VDI guideline 4600. A basic subtask of the project is to provide secured, publicly accessible basic data for frequently used materials and services, notably current and heat, and their coupled generation as input for life cycle inventories and material flow analyses, LCAs and ecoaudits. These basic data are provided in a user-friendly and updateable information and data bank system. A close connection – first of all for our own products – with our project 'LCA data bank' is ensured. By way of this information and data bank system, the expenditure of work on future LCAs will be considerably reduced as duplications can be eliminated due to a recurrent new assessment of energy-related basic data.

II. 7 Chemical products

More than two years ago (in 1997), the results of the 'comparing ecological assessment' of detergents met with high interest.¹² Here the traditional, today still available heavy-duty detergents come off worst as compared with later powder detergents. The clear differences of energy consumption and chemical input into environment due to the differing washing behaviour of the consumers were also shown. Accordingly, we have to clearly higher estimate the value of the user information. In particular, I welcome the obligation by the European detergent association to undertake measures for reducing energy consumption worldwide by 5 %, and the consumption of detergents by 10 % before 2002. The development into supercompact detergents has to be promoted in an essentially more consequent way. The market shares of traditional heavy-duty detergents are still between 30 and 40% in Germany. Solely with one per cent of these detergents on the (German) market, 2,800 tons of detergents are discharged into sewage and environment, which extends the limit by 2,800 tons. The detergent industry should also make use of other existing market elements, e.g. the ecolabel.

A further project in process at present concerns the LCA 'Raw materials for detergents and cleaning materials and their use in commercial laundries. In this study, the most important washing processes with regard to the technologies applied and detergents used are dealt with. Then follows the assessment of commercial model detergents and model processes. It is also envisaged to compare washing, drying and ironing processes with and without softeners. Recommendations for action re-

lated to environmental protection are to be prepared with the actors participating.

III LCAs and Product-Related Environmental Policy: Summarizing theses

The LCA subject is becoming increasingly relevant to the work of the Federal Environmental Agency. I do hope to have clearly shown in which way the conclusions – already available or to be expected – are included in very differing areas of the technical policy discussion. For this reason, I have mentioned here the various keywords, from the implementation of the 'Act for promoting closed substance cycle waste management', via the assessment of new technologies, up to user information. As a matter of course, LCAs in all areas mentioned may be only one pillar of our technical foundations.

When appreciating the significance of LCAs for a product-related environmental policy, I may underline the following basic positions representing also the spirit of ISO 14040:

1. The environmental improvement of products by means of LCAs is a joint task to be fulfilled by economy, government and society. This may be reached only by way of a fruitful dialogue and with respect of the respective interests.
2. The enterprises have by nature to fulfil the task of acting in the framework of the ground rules of a market economy. In view of the increasingly aggravating competitive situation in all fields, the interest of economy in clear targets effective on the long term, on the one hand, and a possibly big scope for implementing them, on the other hand, as environmental targets may be only pursued in the long run by economically sound enterprises and branches.
3. Hereby, the task of the government is primarily to formulate and to substantiate the relevant environmental targets and priorities of an ecologically oriented product development derived from them and to discuss them with all circles concerned. This process of discussion is also a bridge to the sustained discussion on a solution of the problems of assessment in LCAs which may be only successful if the priorities of environmental protection are included.
4. At the same time, in particular also in view of the increasing importance of voluntary measures in setting precautionary targets, the government may not be released from the responsibility to launch initiatives in order to pursue targets recognized as being correct also in the product areas and speed up their fulfilment. As has been repeatedly stressed – LCAs, however, may be only one of the technical bases of decision-making in a very complicated decision-making process.
5. The fear of parts of economy that the results of LCAs might be considered by the government in taking one-sided and arbitrary measures with impacts distorting competition nationally and globally, appears to be unfounded in view of the joint interest in a constructive use of LCAs. Incidentally, ISO 14040 makes extremely strict demands on LCAs assisting in substantiating measures of environmental policy, e.g. as regards transparency, participation of interested circles and in the framework of the so-called 'critical review'.
6. In this sense also the participation of social groups, in particular environmental and consumer associations and trade unions, in the discussion on LCAs will be a necessary prerequisite for reaching these targets.

¹² Ökoinstitut e.V. Freiburg: Vergleichende ökologische Beurteilung von Waschmitteln – Produktlinienanalyse Waschen und Waschmittel (Comparing ecological assessment of detergents – product line analysis of washing and detergents), Berlin 1997 (UBA-TEXTE 1/97).